The author discusses at some length the changes of physiography in tropical America, in their bearing on the history of the West Indian Islands. In Jurassic times there is evidence of a great expansion of land from the Rocky Mountains eastwards in North America, and over the north-eastern part of South America. "It is probable that the continental mass as a whole, practically equivalent in area to the present one, occupied a position slightly east of its present locus." The American fossiliferous marine Jurassic belonged to the Pacific area, and may have extended as far to the east as Havana. No evidence is recognised for establishing land connection between the islands and North and South American lands in Post-Jurassic time. The first evidence of Antillean lands is found in eruptive rocks of late Cretaceous time, when it is probable there were marine volcanoes. The land débris constituting the Eocene strata proves the pre-existence of extensive Cretaceous land-areas. In late Eocene and early Oligocene times there was a profound regional subsidence, and 3000 feet of purely oceanic deposits were accumulated. A great uplift occurred in late Oligocene or Miocene times, and subsequently many minor movements of elevation and depression have taken place.

In an appendix some Cretaceous and Eocene corals from Jamaica are described by Mr. T. Wayland Vaughan.

H. B. W.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

UNDER the will of Mr. James Brown Thomson, of Kinning Park, Glasgow, the University of Glasgow will receive 10,000*l*., and the Glasgow Technical College, 2000*l*.

MR. W. H. DERRIMAN, assistant lecturer in physics at the Technical College, Huddersfield, has been appointed to a similar post in University College, Liverpool.

Science states that Dr. Jokichi Takamine, of the University of Tokio, Japan, known for his researches on digestive ferments, is at present on a tour of inspection of the larger educational institutions of the United States. He has been sent by the Japanese Government to examine the scientific work and methods of American universities.

AN English Educational Exhibition will be held at the Imperial Institute on January 5-27. The exhibits will comprise students' work, and will refer to primary, secondary, technical, and higher education of both sexes. A series of lectures and conferences on educational subjects and demonstration lessons will be held at the Imperial Institute during the Exhibition. Particulars of the chief science conferences have already been given (p. 189).

THE *University Correspondent* has published its annual crop of amusing mistakes made by schoolboys in answers to examination questions. The following answers, selected from many similar ones, show how easy it is for pupils to receive inaccurate and confused impressions when given didactic instruction, and also how essential it is that examination questions should be explicit:—When would you expect an eclipse of the sun to take place? In the night.—The sun never sets on English possessions, because the sun sets in the west, and our colonies are in the north, south, and east.—The exports of Ceylon are peculiar to any other part of the world. The chief are piano steamers (sc. P. and O. steamers).—A cubic foot of water weighs 64 lbs. : ∴ a squate foot of water weights 16 lb., and a foot of water weights 4 lb.—The three principle parts of the eye are the pupil, the moat, and the beam.—A mariner's compass is a little poast stuck up in the sea, and when people want to know the way, the ships go and look at it.—Many other instances might be given, but those quoted are sufficient to show that there is much room for improvement in the teaching of scientific subjects while such hazy ideas exist in the minds of schoolboys.

SCIENTIFIC SERIAL.

Symons's Monthly Meteorological Magazine, December, 1899.—The aims of meteorology. This is a brief synopsis of a "Report on the Meteorology of Maryland," prepared by direction of the U.S. Weather Bureau. The article on special observations and investigations enumerates twenty-nine heads under which observations are made. While all are useful in different ways, any single service dealing with one-third of them would have little energy left for the improvement of the important work of weather prediction. Mr. Symons considers that the perusal of the work, consisting of about a hundred pages, is not merely instructive as a guide to the future, but also very useful as a record of past progress.—Kites and meteorology, by W. A. Eddy. This is a statement, in chronological order, of the various occasions on which kites have been used in meteorological investigations, from those in 1749, by Wilson and Melvill, near Glasgow, and in 1836 by Admiral Bach in Hudson Strait, in sending up thermometers, to those very successful experiments made in recent years at the Blue Hill Observatory, by means of the Eddy and Hargrave kites.—The same number also contains some interesting notes on damage by lightning, injurious effects of fog on plants, and unusual snow crystals.

SOCIETIES AND ACADEMIES.

EDINBURGH.

Royal Society, December 19, 1899.—Prof. Duns in the chair.—Dr. J. Souttar McKendrick, of Glasgow, read a paper on the zymolysis of tissues, physiological and pathological. After a short bibliographical sketch of the nature and action of enzymes as they exist in the digestive juices, with their methods of extraction, and mention of the observations of Nasse, Brucke, and others who had attempted to demonstrate the presence of ptyalin and pepsin in muscle, the author described in detail his method of procedure. He made glycerine extracts of between sixty and seventy tissues of the rabbit, child, adult, and those obtained post-mortem, and with each tissue extractive he endeavoured to demonstrate the presence or absence of enzymes similar in their action to ptyalin or amylopsin, pepsin, trypsin, inversin and rennin. A series of extractives were also made from certain pathological tissues, namely, carcinomata, sarcomata, tissues from an eclamptic, &c. The results pointed to the presence of pepsin, or a substance analogous to it, in all the tissues, physiological and pathological; to the presence of a diastatic ferment in most of the tissues; to the absence of tripsin except in the pancreas; to the absence of a milk curdling ferment except in those tissues in which it is known to exist; to the absence of an inversive ferment. Malignant tissues were found to have proteolytic and diastatic properties. Though rabbit's blood contained no diastatic enzyme, eclamptic blood contained such an enzyme in large amount; and all eclamptic tissues yielded extracts with markedly diastatic properties. The author in conclusion advocated the similar examination of the blood in all obscure diseases and of carcinomatous and sarcomatous growth.—Prof. Mitchell communicated a paper on the cooling of a body in a steady blast of air, Part II. In the later experiments the air currents had been varied from 10 to nearly 1000 metres per minute, and the temperature had been carried up to 120° C. Newton's law of cooling under these conditions was found to hold with great accuracy, and Newton's original statement, imperfectly quoted by most writers, completely verified. The rate of cooling was shown to be proportional to the difference of temperature for a given strength of blast, and to be proportional (for a given temperature) to the strength of blast up to a value of about 450 metres per minute, but to fall off from the law of proportionality for higher values. This was explained as a result of unsteadiness in the air current at these higher values—Dr. Mahalanobis described a new form of myograph, which consisted essentially of a T-shaped lever, pivoted so as to admit of horizontal movements free from the influence of gravity. The instrument was suitable for obtaining myograms of isometric and isotonic contractions of muscles, and most of the ordinary experiments on fatigue, tetanus, &c. The momentum of the lever during contraction of the muscle was approximately counterbalanced by the slight increase of tension in an elastic band, thus securing a fairly isotonic condition of the muscle.—Dr. C. G. Knott drew attention to the fact that Prof. Swan, of St. Andrews, had in 1859 constructed and used the form of photometer commonly associated with the names of Lummer and Brodhun, who described it in 1889. Swan's own description and figure will be found in the *Trans.* R.S.E., vol. xxii., 1861.—Prof. Tait, in a note on the claim recently made for Gauss to the invention of quaternions, showed that what Prof. Klein, both in the *Mathematische Annalen* and in his (and Sommerfeld's) treatise *Ueber die Theorie des Kreisels* ascribed to Gauss was not the Hamiltonian quaternion at all, but a particular and very limited kind of strain, which consisted of a simple rotation combined with an isotropic expansion, and thus involving four constants only. Klein and Sommerfeld's attempted identification of Gauss' operator with Hamilton's quaternion indicated a curious misapprehension on their part of the real essence of a quaternion.—Dr. C. G. Knott, in a paper on the same subject, gave a detailed criticism of the section in Klein and Sommerfeld's treatise devoted to the discussion of the theory of quaternions.

PARIS.

Academy of Sciences, December 26, 1899.—M. van Tieghem in the chair.—M. H. Milne-Edwards was elected Vice-President of the Academy for the year 1900.—Note on the work contained in the volume of the "Annales de l'Observatoire de Paris de 1897," by M. Lœwy. This volume inaugurates a new series of *Annales*, differing from preceding volumes both in the nature of the work carried out and the form chosen for publication —On the radiation of radio-active bodies, by M. Henri Becquerel. There would appear to be a fundamental difference between the radiations of radium and polonium salts, in spite of their similar photographic action, as the polonium radiations placed in a magnetic field show no influence of the same order as observed for radium.—Experimental cultures on the adaptation of plants to the Mediterranean climate, by M. Gaston Bonnier. The object of these researches was to find out if plants taken from temperate climates to the Mediterranean could so modify their form and structure as to adapt themselves to their new surroundings. Experiments were carried out with a large number of different species, and nearly all showed, even after one season, notable differences in form, the stems becoming more ligneous, even stems of one year's growth, the leaves larger and thicker with the veins more strongly marked.—Researches on the tautomerism of benzoyl-benzoic acid, by MM. A. Haller and A. Guyot. From its mode of formation from benzene and phthalyl chloride, benzoyl-benzoic acid would appear to have the constitution of an oxylactone, and this view is confirmed by the formation of diphenyl-phthalide from its chloride. But, on the other hand, in many reactions both the chloride and acid exhibit undoubted ketonic properties. It thus appeared to be interesting to see if the tautomeric modifications of this acid could be obtained as methyl ethers. Methyl-*o*-benzyl benzoate was accordingly prepared by five different methods, direct etherification by hydrochloric acid, interaction of methyl iodide and the silver salt, interaction of benzoyl-benzoic anhydride and sodium methylate, action of sodium methylate upon acetyl-benzoyl-benzoic anhydride, and upon benzoyl-benzoic chloride. In all cases the same ether was produced, which would appear to be the true ketonic ether, $C_6H_5.CO.C_6H_4.CO.(OCH_3)$. —Remarks by M. Albert Gaudry, upon a work of M. Erland Nordenskjold.—General Gallieni was elected a correspondent for the Section of Geography and Navigation.—Observation of the eclipse of the moon of December 16, 1899, with the photographic equatorial at Toulouse, by M. Montangerand. Experiments with plates of different degrees of sensitiveness showed that panchromatic plates give better results with a total than a partial eclipse.—Observations of the new planet EY (Charlois), made at the Observatory of Besançon, by M. P. Chofardet.—Organisation of the daily registration of the entire chromosphere of the sun at the Observatory at Meudon. First results, by M. H. Deslandres.—Remarks on the preceding communication, by M. J. Janssen.—On the employment of triphase currents in Radiography, by M. Delézinier.—On the discontinuities produced by the brusque expansion of compressed gases, by M. Paul Vieille. Diaphragms of collodion were constructed capable of standing a pressure up to twenty-seven atmospheres. By the sudden rupture of this diaphragm, an explosive wave was set up, the front of which was more symmetrical than when explosives are used. The mean velocities of propagation of the wave were measured at different distances from the diaphragm. Velocities could thus be obtained of over 600 metres per second, greater than the velocity of sound.—On some phenomena presented by iron, by M. Galy-Aché. The results of the experiments upon a very pure sample of iron are in accord with the views of Osmond and Werth, that there are two allotropic varieties of iron, α-iron, stable at the ordinary temperature, and β-iron, stable at high temperatures.—On the changes in volume accompanying the hardening of hydraulic cements, by M. H. Le Chatelier. The contraction was measured by sealing up the cements in the bulb of a thermometer containing water. The absolute contraction after six months was between 4 c.c. and 5 c.c. per 100 grams of cement. There was at the same time an apparent expansion, sufficient in some cases to burst the bulbs of the thermometers.—On the temperature of transformation of the two varieties, quadratic and orthorhombic, of mercuric iodide, by M. D. Gernez. The transformation-temperature is 126°. The temperature of 75°, found by M. Wyrouboff, is due to an error caused by his working *in vacuo*.—New experiments upon the activity of manganese with respect to the phosphorescence of strontium sulphide, by M. José Rodriguez Mourelo.—On molybdenum silicide, by M. E. Vigouroux. Silicon combines directly with molybdenum in the electric furnace, forming Mo_2Si_3, which is obtained pure with difficulty. It burns in chlorine at 300°, giving silicon tetrachloride and molybdenum perchloride.—On molybdenum disulphide, by M. Marcel Guichard. Of the various methods suggested for the preparation of molybdenum disulphide, two only are satisfactory, the fusion of potassium carbonate and sulphur with molybdenum dioxide, and heating sulphur to a high temperature with ammonium molybdate. The first method gives a crystalline product, the second an amorphous one. By the action of heat a new sesquisulphide is formed, further particulars of which will be given in a subsequent note.—The action of nitrous acid upon the leucobase $C_{18}H_{24}N_2$, by M. A. Trillat.—Heat of neutralisation and acidimetry of cacodylic acid, by M. Henri Hibbert. Cacodylic acid is a feeble monobasic acid, being neutral to helianthine and monobasic to phenol-phthalein.—The hydrate of sodium dioxide and the prepration of hydrogen peroxide, by M. de Forcrand.—On the anhydrous sesquichlorides of rhodium and iridium, by M. E. Leidié. The double chloride Rh_2Cl_66NaCl. (with $3H_2O$ or $18H_2O$), heated in a current of dry hydrogen chloride up to 440° C gives a mixture of Rh_2Cl_6 and NaCl from which the latter can be removed by washing with water. The hydrogen chloride may advantageously be replaced by chlorine if the double salt is previously dried at 105°–110° C. The corresponding iridium chloride is best obtained by heating $Ir_2Cl_66NH_4Cl$ in chlorine at 440° C.—The biochemical oxidation of propylglycol, by M. André Kling. Following up his previous work on this subject, the author has now proved that the reducing body formed by the oxidation of $CH_2(OH)CH(OH)CH_3$ is acetal, $CH_3.CO.CH_2OH$.—On the preparation of the carbazides. Action of the hydrazines upon the phenolic carbonates, by MM. P. Cazeneuve and Moreau. By the interaction of phenyl carbonate and phenyl-hydrazine a good yield of carbohydrazide is obtained. Similarly hydrazine hydrate gives carbazide, $CO(NH.NH_2)_2$. The method appears to be capable of general application.—Combinations of lithium chloride with ethylamine, by M. J. Bonnefoi. From the dissociation pressures of the compounds $LiCl.C_2H_5(NH_2)$, $LiCl.2C_2H_5(NH_2)$, $LiCl.3C_2H_5(NH_2)$, the heats of dissociation are calculated by Clapeyron's formula to be 13·72 cal., 11·09 cal., and 10·50 cal. These numbers were also measured directly in the calorimeter, and found to be 13·83 cal., 10·98 cal., and 10·57 cal. respectively.—On narceine, by M. Émile Leroy. Measurements of the heats of hydration, combustion, and formation of narceine and its salts.—On the evolution of mineral matter during germination, by M. G. André.—On the estimation of the halogens in organic compounds, by M. Amand Valeur. The determination of the halogens in organic compounds can be carried out very rapidly and accurately in the calorimetric bomb, provided that a suitable quantity of naphthalene is burned at the same time. For chlorine and bromine, strong ammonia is placed in the bomb, and this liquid analysed volumetrically either by Mohr's or Volhard's method. The whole analysis can be finished in half an hour. For iodine the ammonia is replaced by potash solution. Tetra-iodo-ethylene, containing 95·5 per cent. of iodine, gave very good results by this method.—On some effects of electric discharges upon the heart of mammals, by MM. J. L. Prevost and F. Battelli. Under the influence of a current of suitable strength, the tremulous vibrations are replaced by true rhythmic contractions of the heart, with restoration of the blood pressure, if the current is applied within fifteen seconds of the appearance of the trembling.—General considerations on the male reproductive organs of the Coleoptera, by M. L. Bordas. —The evolution without heterogony of an Angiostome of the ringed adder, by M. Railliet.—On the pigment of the Arenicolæ, by M. Pierre Fauvel.—Chlorophyllian assimilation in solar light which has traversed leaves, by M. Ed. Griffon. The passage of light through a single leaf causes a notable weakening in the activity of those rays which are required for the chlorophyllian assimilation. The results vary much with the conditions of temperature and lighting.—On a bacterial zooglea of definite form, by M. Radais.—On the elements of limited symmetry, by M. Walleront.—Observations on the structure of the diluvium of the Seine, by M. Stanislas Meunier.—On a new hypothesis on the nature of the physical conditions of smell, by MM. Vaschide and Van Melle. The authors combat the view that the sense of smell is due to the emission of particles from the substance, and suggest that the effect is produced by rays of short wave-length, analogous, but not similar to, light rays, Röntgen rays, &c. They adduce ten arguments in favour of their hypothesis.—On a cranial campylogram, by MM. Blin and Simon. A description of an instrument for measuring the curves of the cranium in the living.—Barometric movements caused on the meridian of the sun by its movement in declination, by M. A. Poincaré.

CAPE TOWN.

South African Philosophical Society, November 29, 1899.—Mr. L. Péringney, President, in the chair.—The President recorded the deciphering, by Mr. Donald Ferguson, of an old stone which has been in the South African Museum since 1855. The stone was known to the late Dr. Atherstone and Mr. C. A. Fairbridge as the Mossel Bay stone. It is a rudely cubical block of sandstone with a cut inscription on one surface, which, however, has been broken across. On the fractured surface, at right angles to the inscribed face, there is a peculiarly shaped cross. Mr. Sclater sent an impression of the inscription to Mr. Ferguson, who translated it as follows: "Here was lost the ship *Sao Gonzalo* in the year 1630. They made [built] two boats . . . ?" An account of the fleet of which the *Sao Gonzalo* formed a part is given in an old MS. in the British Museum, a transcript and translation of this being sent by Mr. Ferguson. The wreck occurred at Bahia Fermoza, now Plettenberg Bay, and the stone had originally marked the spot. Some of the present inhabitants of Plettenberg Bay remember a stone having been sent to Cape Town, and it is most probably this so-called Mossel Bay stone.—Dr. Gilchrist read a paper on, and showed a specimen of, a new Aplysia. The new species (*Paraplysia Lowii*), found at East London, is the third known one of the group of the Tectibranchiata, characterised chiefly by the peculiar position of the rhinophora. It differs from the other two species, *P. piperata* (Smith) and *P. monhoti* (Gilchrist) in several features which have been supposed to be characteristic of the genus Paraplysia proposed by Pilsbury.—Messrs. Rogers and Schwarz gave an account of the "Orange River Ground Moraine" in the neighbourhood of Prieska. Sections near Prieska show an ancient morainic conglomerate passing underneath the so-called Kimberley shales, and lying unconformably on the older Jasper rocks, quartzites and granite. The conglomerate contains numerous striated boulders, and the underlying rock often presents a rounded, scratched surface, which frequently forms distinct *roches moutonnées*. The ice passed from north to south. The authors could not say certainly what the exact relation of this conglomerate to the Dwyka conglomerate is, but are of opinion that it partially at least represents the land-formed ground moraine of the ancient glacier whose water-borne detritus has elsewhere formed the Dwyka conglomerate. The paper was illustrated by photographs and specimens of the striated boulders and floor.—An account of the earthquake of September 15, 1899, presented by the secretary, was taken as read.

DIARY OF SOCIETIES.

THURSDAY, JANUARY 4.

ROYAL INSTITUTION, at 3.—Fluids in Motion and at Rest: C. V. Boys, F.R.S.

RÖNTGEN SOCIETY, at 8.—The Interpretation of Skiagrams: Chisholm Williams.

FRIDAY, JANUARY 5.

GEOLOGISTS' ASSOCIATION, at 8.—Our Older Raised Beaches: Address by Sir Archibald Geikie, F.R.S.—A New Rhætic Section at Bristol: W. H. Wickes

SATURDAY, JANUARY 6.

ROYAL INSTITUTION, at 3.—Fluids in Motion and at Rest: C. V. Boys, F.R.S.

MONDAY, JANUARY 8.

SOCIETY OF CHEMICAL INDUSTRY, at 8.—Colour Photography: J. W. Hinchley.—Cinchona: J. M. Vargas Vergara.—Microscopic Character of Vicunna, Camel-hair, and Alpaca: R. M. Prideaux.

TUESDAY, JANUARY 9.

ROYAL INSTITUTION, at 3.—Fluids in Motion and at Rest: C. V. Boys, F.R.S.

INSTITUTION OF CIVIL ENGINEERS, at 8.—The Purification of Water after its Use in Manufactories: Reginald A. Tatton.—Experiments on the Purification of Waste Water from Factories: W. O. E. Meade-King.

ANTHROPOLOGICAL INSTITUTE, at 8.30.—The Oak and the Thunder God: H. M. Chadwick.—Notes on some Caves in the Zitzikamma, or Outeniqua District, near Knysna, South Africa, and the Objects found therein: Dr. H. D. R. Kingston.—Notes on Skeletons found in the Zitzikamma and Knysna Caves: F. C. Shrubsall.

WEDNESDAY, JANUARY 10.

GEOLOGICAL SOCIETY, at 8.—On a Particular Form of Surface, the Results of Glacial and Subaerial Erosion, seen on Loch Lochy and elsewhere: Dr. W. T. Blanford, F.R.S.—On the Geology of Northern Anglesey, Part II.: C. A. Matley.—The Formation of Dendrites: A. O. Watkins.

THURSDAY, JANUARY 11.

MATHEMATICAL SOCIETY, at 8.—A Problem in Resonance, illustrative of the Mechanical Theory of Selective Absorption: Prof. Lamb, F.R.S.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Report of the Institution's Visit to Switzerland. The Report will be taken as read, and the discussion will be opened by Mr. Crompton by a Comparison between British and Continental Practice in Electrical Engineering.

FRIDAY, JANUARY 12

ROYAL ASTRONOMICAL SOCIETY, at 8.

INSTITUTION OF CIVIL ENGINEERS, at 8.—The Theory of Structures and Strength of Materials: Prof. T. Claxton Fidler.

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